



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/059,236	01/31/2002	Katsumi Oomori	2002-0091	8980

513 7590 09/08/2003

WENDEROTH, LIND & PONACK, L.L.P.
2033 K STREET N. W.
SUITE 800
WASHINGTON, DC 20006-1021

EXAMINER

LEE, SIN J

ART UNIT	PAPER NUMBER
----------	--------------

1752

DATE MAILED: 09/08/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicant(s)

10/059,236

Applicant(s)

OOMORI ET AL.

Examiner

Sin J Lee

Art Unit

1752

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-12 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 09/291,116.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4,5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 5, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay et al (5,861,231) in view of Padmanaban et al (5,852,128).

Barclay et al teach a photoresist composition that comprise a photoacid generator and a copolymer including (1) repeating units that contain acid-labile groups, (2) repeating units that are free of both reactive and hydroxyl moieties, and (3) repeating units that contribute to aqueous developability of a photoresist containing the copolymer as a resin binder. See particularly, col.3, lines 26-31, lines 40-62, col.4, lines 17-18, lines 22-25, lines 40-49, lines 66-67, col.5, lines 1-20, lines 28-30, lines 54-56, lines 66-67, col.6, lines 1-7, lines 15-26, lines 35-60, col.7, lines 18-20, lines 25-30, lines 34-39, col.8, lines 1-2, line 11, col.9, lines 8-16, lines 22-23, Example 2, TABLE 1, Example 8, claims 1 and 2.

With respect to the component (A) of the present claim 1, Barclay et al teach in col.6, lines 35-59 a particularly preferred copolymer of formula II for their invention, and this copolymer teaches the presently claimed copolymer having *hydroxyl group-containing styrene units, styrene units* (since the prior art's variable *m* can be zero), and *(meth)acrylate ester units having a solubility reducing group* (Barclay teach *t-butyl group* to be their preferred R group) *capable of being eliminated in the presence of an acid*.

Art Unit: 1752

More specifically, in Table 1 (col.11), it can be shown that the terpolymers made in Barclay's Examples 3-6 include a hydroxystyrene repeating unit, styrene repeating unit, and t-butyl acrylate ester repeating unit and that the mole % for each of those repeating units falls within the present mole % ranges of claim 1. Therefore, Barclay teaches present component (A) of claim 1.

With respect to the component (B) of the present claim 1, although Barclay et al do not explicitly teach the presently claimed iodonium salt containing a fluoroalkyl sulfonate ion having 3-10 carbons as the anion, the prior art does state in col.8, lines 1-2 that onium salts are generally preferred acid generators for their composition. Also, Barclay includes *halonium salts* as one of suitable onium salts that can be used in his invention (see col.8, lines 7-10). Iodonium salts containing a fluoroalkyl sulfonate ion with 3-10 carbons as the anion are well known in the art. For example, see Padmanaban et al, col.8, lines 48-67, col.9, lines 1-19, and *claim 5*, wherein the listed examples of onium salts to be used as photoacid generator include bis(4-tert-butylphenyl)iodonium hexafluoropropane sulfonate (there are only 15 examples listed in Padmanaban's claim 5). It is the Examiner's position that based on the teachings of Barclay et al in view of Padmanaban et al, it would have been obvious for one ordinarily skilled in the art to use well known onium salts in the art such as bis(4-tert-butylphenyl)iodonium hexafluoropropane sulfonate as taught by Padmanaban et al as Barclay et al's acid generator with reasonable expectation of achieving a photoresist composition having optimum lithographic performance characteristics such as high resolution, depth of focus and stability. Also, although Barclay et al do not explicitly disclose the claimed range for the amount of their photoacid generators, they do teach in Example 8 that for 4.604 parts by weight of their terpolymer, 0.186 parts by weight of their photo acid generator was used. This number converts to 4.04 parts by weight of

Art Unit: 1752

the photoacid generator based on 100 parts by weight of the terpolymer, and since this number (4.04 parts by weight) falls within presently claimed range of 1-20 parts by weight, the prior art teaches presently claimed amount for the component (B).

Therefore, Barclay in view of Padmanaban would render obvious present invention of claims 1-3 and 9.

With respect to present claim 5, all of those polymers used in Barclay's Examples 3-6 have molecular weights that fall within the present range of 3000 to 30000.

Therefore, Barclay in view of Padmanaban would render obvious present invention of claim 5.

3. Claims 6-8 and 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barclay et al (5,861,231) in view of Padmanaban et al (5,852,128) as applied to claim 1 above, and further in view of Ohsawa et al (5,847,218).

With respect to present claim 6, Barclay et al (either alone or in combination with Padmanaban) do not specifically disclose that their photoresist composition further comprises a secondary or tertiary amine compound. Ohsawa et al disclose a chemically amplified positive resist compositions and teach in col.20, lines 4-7 that their resist composition may further contain nitrogenous compounds (*as well as carboxylic acid derivatives*) for improving PED (post exposure delay) stability. Then, Ohsawa et al list alcoholic nitrogenous compounds as one of the eleven kinds of the nitrogenous compounds that can be used (see col.20, lines 23-30). Triethanolamine (which is a tertiary alkanolamine as claimed in present claim 10) is one of the eleven specific examples of the alcoholic nitrogenous compound listed in col.21, lines 21-25. Since there are only eleven kinds of nitrogenous compounds to choose from, it would have been obvious to one of ordinary skill in the art to choose alcoholic nitrogenous compounds out of the eleven kinds of nitrogenous compounds and furthermore to

Art Unit: 1752

choose triethanolamine as the specific alcoholic nitrogenous compound and use it in Barclay's composition to improve PED stability since there are only eleven specific examples of alcoholic nitrogenous compounds to choose from. Also, Ohsawa et al teach that the nitrogenous compound is present in an amount of about 0.001 to 4 parts in the resist composition. This range overlaps with the claimed range of present claim 19 and thus makes the presently claimed range *prima facie* obvious. In the case "where the [claimed] ranges overlap or lie inside ranges disclosed by the prior art," a *prima facie* case of obviousness would exist which may be overcome by a showing of unexpected results, In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Therefore, Barclay et al in view of Padmanaban et al and further in view of Ohsawa et al would render obvious the present inventions of claims 6 and 10.

With respect to present claims 7 and 11, as explained above, Ohsawa et al teach the addition of carboxylic acid derivatives (as well as nitrogenous compounds) for improving PED stability. Ohsawa et al teach (col.20, lines 19-22) the amount of the carboxylic acid compounds to be 0.1 - 15 parts, thus making the claimed range of 0.001 to 10 parts in present claim 20 *prima facie* obvious. See In re Wertheim, *supra*. Also, most of the examples of carboxylic acid derivatives listed by Ohsawa et al in col.20, lines 10-19 are clearly aromatic carboxylic acid compounds. Based on Ohsawa's teaching, it would have been obvious to one of ordinary skill in the art to add an aromatic carboxylic acid compound in Barclay's composition in order to improve PED stability as taught by Ohsawa. Therefore, Barclay et al in view of Padmanaban et al and further in view of Ohsawa et al would render obvious the present inventions of claims 7 and 11.

With respect to present claim 12, present claim language does not require the presence of the phosphorus-containing oxo acid compound. It only requires that if the

Art Unit: 1752

acid compound of claim 7 happens to be a phosphorus-containing oxo acid compound, then the phosphorus-containing oxo acid compound should be a phenylphosphonic acid. Therefore, Barclay in view of Padmanaban and further in view of Ohsawa would still render obvious present invention of claim 12.

With respect to present claim 8, Ohsawa et al include amide derivatives as one of the eleven kinds of nitrogenous compounds to be added for the purpose of improving PED stability. Also, N,N-dimethylacetamide (as claimed in claim 8) is one of the eight specific examples of the amide derivative listed by Ohsawa et al in col.21, lines 26-29. Therefore, it would have been obvious to one of ordinary skill in the art to choose amide derivatives out of the eleven kinds of nitrogenous compounds and furthermore to choose N,N-dimethylacetamide (since there are only eight to choose from) as the specific amide derivative compound and use it in Barclay's composition in order to improve PED stability as taught by Ohsawa et al. Also, since Ohsawa et al teach that their nitrogenous compound is present in an amount of about 0.001 to 4 parts in the resist composition, and since this range overlaps with the claimed ranges of present claim 8, the prior art's teaching would have made the presently claimed range *prima facie* obvious. See In re Wertheim, supra. Therefore, Barclay in view of Padmanaban and further in view of Ohsawa would render obvious present invention of claim 8.

4. Claims 1-3, 5, 6, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamachika et al (5,679,495) in view of Padmanaban et al (5,852,128).

Yamachika et al teach a radiation sensitive resin composition comprising a polymer which becomes alkali-soluble in the presence of an acid and a photoacid generator. For the present component (A) of claim 1, the prior art teaches (col.3, lines

25-53) that the polymer has a recurring unit of hydroxystyrene, a recurring unit of t-butyl (meth)acrylate, and a recurring unit C). As examples for the monomer which makes up the recurring unit C), the prior art teaches vinyl group-containing compounds and (meth)acryloyl group containing compounds. As specific examples for the vinyl group-containing compounds, the prior art include six kinds of compounds one of which is aromatic alkenyl compounds. Furthermore, as one of the four more specific examples for the aromatic alkenyl compounds, the prior art teaches *styrene*. See col.4, lines 42-50. Since there are only two general examples to choose from, it would have been obvious to one of ordinary skill in the art to choose vinyl group-containing compounds, and also since there are only six kinds of compounds to choose from, it would have been obvious to one of ordinary skill in the art to choose aromatic alkenyl compounds such as styrene to be the monomer for recurring unit C) with a reasonable expectation of achieving a radiation sensitive resin composition excellent in pattern shape, sensitivity, contrast, developability (*furthermore, in their Synthesis Example 1, Yamachika actually make a polymer from the monomers of vinylphenol (i.e., hydroxystyrene), t-butyl acrylate, and styrene*). Yamachika furthermore teaches (in col.3, lines 58-61, col.4, lines 5-8, lines 14-21) the proportion of the hydroxystyrene recurring units, t-butyl (meth)acrylate recurring units, and the recurring unit C) to be 5-75%, 10-70%, and 0.5-50% respectively. Since these ranges overlap with the present ranges, the prior art's teaching would have made the present ranges for the component (A) *prima facie* obvious. See In re Wertheim, supra. Therefore, the prior art's teaching would render obvious the present component (A).

For the present component (B) of claim 1, Yamachika teaches (col.5, lines 20-29) that their photoacid generator includes onium salt compounds (such as iodonium salts) as well as four other kinds of compounds. Although Yamachika does not explicitly

Art Unit: 1752

teach the presently claimed iodonium salt containing a fluoroalkyl sulfonate ion, such iodonium salts containing a fluoroalkyl sulfonate ion with 3-10 carbons as the anion are well known in the art. For example, see Padmanaban et al, col.8, lines 48-67, col.9, lines 1-19, and *claim 5*, wherein the listed examples of onium salts to be used as photoacid generator include bis(4-tert-butylphenyl)iodonium hexafluoropropane sulfonate (there are only 15 examples listed in Padmanaban's claim 5). It is the Examiner's position that based on the teachings of Yamachika in view of Padmanaban et al, it would have been obvious for one ordinarily skilled in the art to use well known onium salts in the art such as bis(4-tert-butylphenyl)iodonium hexafluoropropane sulfonate as taught by Padmanaban et al as Yamachika's acid generator with reasonable expectation of achieving a photoresist composition having optimum lithographic performance characteristics such as high resolution, depth of focus and stability. In col.7, lines 61-64, Yamachika et al teach the amount of the photoacid generator to be 0.05-20 parts by weight per 100 parts by weight of the polymer (A). Since this range overlaps with the present range, the prior art's range would have made the present range *prima facie* obvious. See In re Wertheim, supra. Therefore, Yamachika in view of Padmanaban would render obvious the present component (B) and thus would render obvious present inventions of claims 1-3 and 9.

With respect to present claim 5, Yamachika teaches (col.4, lines 63-67) that their polymer have weight-average molecular weight range of 1,500 to 300,000. Since this range overlaps with the present range 3,000-30,000 of claim 18, the prior art's teaching would render present range *prima facie* obvious. See In re Wertheim, supra. Therefore, Yamachika in view of Padmanaban would render obvious present invention of claim 5.

With respect to present claim 6, Yamachika teaches (col.10, lines 50-60) the addition of an acid-diffusion controller into his radiation sensitive composition in order to improve pattern shape. As examples for the acid-diffusion controller, the prior art includes (col.10, lines 61-67, col.11, lines 1-4) secondary amine compounds as well as tertiary amine compounds, and specifically the prior art uses tripropylamine and tri-n-butylamine in their working examples (see Table 1 and col.19, lines 62-65). The prior art also teaches (col.11, lines 30-33) the amount of the acid-diffusion controller to be 0.001-10 parts by weight per 100 parts by weight of their polymer (A), and this range exactly overlaps with the present range. Therefore, Yamachika in view of Padmanaban would render obvious present invention of claim 6.

5. Claims 7, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamachika et al (5,679,495) in view of Padmanaban et al (5,852,128) as applied to claim 15 above, and further in view of Sato et al (5,955,240).

Yamachika in view of Padmanaban do not teach present carboxylic acid of claims 7 and 11. Sato et al teach (col.10, lines 34-42) adding an organic carboxylic acid compound to a positive photoresist composition in order to improve a sensitivity, a resolution, good width characteristic in focus depth and to achieve resist patterns with good profiles and good post-exposure storage stability. As examples for the organic carboxylic acid compound, the prior art first teaches (col.10, lines 43-49) six different kinds of compounds one of which is aromatic carboxylic acid compound (aromatic carboxylic acid compound is also taught as one of the three *especially preferred kind* - see col.11, lines 27-29). Since there are only a few to choose from, it would have been obvious for one of ordinary skill in the art to choose an aromatic carboxylic acid compound and use it in Yamachika et al's positive resin composition with a reasonable expectation of improving in sensitivity, resolution, good width characteristic in focus

depth and obtaining resist patterns with good profiles and good post exposure storage stability as taught by Sato. Since Sato et al teach (col.11, lines 62-67) that the proportion of the organic carboxylic acid compound to be 0.01 to 1%, and since this range overlaps with the present range of claim 7, the prior art's teaching would have made the present range *prima facie* obvious. See In re Wertheim, supra. Therefore, Yamachika et al in view of Padmanaban et al and further in view of Sato et al would render obvious present inventions of claims 7 and 11.

With respect to present claim 12, present claim language does not require the presence of the phosphorus-containing oxo acid compound. It only requires that if the acid compound of claim 7 happens to be a phosphorus-containing oxo acid compound, then the phosphorus-containing oxo acid compound should be a phenylphosphonic acid. Therefore, Yamachika in view of Padmanaban and further in view of Sato et al would still render obvious present invention of claim 12.

Allowable Subject Matter

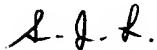
6. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. None of the cited prior arts teaches or suggests the presently claimed iodonium salt compound containing a *nonafluorobutane* sulfonate ion as the anion.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is (703) 305-0504. The examiner can normally be reached on Monday-Friday from 8:30 am EST to 5:00 pm EST.

Art Unit: 1752

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Janet Baxter, can be reached on (703) 308-2303. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9311 for after final responses or (703) 872-9310 for before final responses.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0661.



S. Lee
9/7/03



ROSEMARY ASHTON
PRIMARY EXAMINER